

Introduction to M-Commerce

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Mobile Commerce also known as M-commerce. It refers to buying and selling of goods or services through the use of Internet enabled wireless devices such as a Mobile phone, Personal Digital Assistant (PDAs), Smartphone, Tablet, Palmtop or any other mobile device.

M-commerce provides the user with the advantage of flexibility and ubiquity. By using the mobile phone, consumers can conduct business transactions without being fixed at a computer terminal or being physically present at the shop. These devices are carried by the user wherever he/she goes, making it possible to access the Internet from any place. It allows real time transactions while on the move. As the popularity of smart phone's and tablets is increasing day by day, more users are moving towards the use of M-commerce. Some of the examples of M-commerce are:

- Purchasing airline tickets
- Purchasing movie tickets
- Restaurant booking and reservation
- Hotel booking and reservation
- Stock market analysis

Banks and other financial institutions are increasingly using M-commerce to retain their business. They allow their customers to access account balance, stock quotes, make transactions via mobile phones. This service is known as Mobile Banking or M-Banking. The stock market services offered via mobile devices is also becoming popular and known as Mobile Brokerage. News information, sports, entertainment, shopping and reservation areas have also grown with the demand for mobile related services.

Benefits of M-Commerce

Mobiles are being used more and more on daily basis and today it is not merely used to make or receive a call. Mobile companies are coming up with new features for their smart phones, which offer consumers ease, flexibility and security at the same time. The ease of availability and faster speed has made M-commerce more popular now-a-days. The web design and development companies have also optimized the websites, such that it can be viewed correctly on mobile devices.

M-commerce is the integration of wireless networks accessed through handheld devices and Internet. The benefits of Internet and E-commerce are offered by M-commerce also. Some of the advantages of M-commerce as listed :

- It provides convenience to the user. In just a few clicks on the mobile device, the user can do shopping, banking and download media files while on the move.

- Mobile device enables the user to be contacted at virtually anytime and anywhere.
- Reduces transaction cost.
- Reduces the time to order. The user does not need to be on the PC or laptop to order.
- Streamline business processes.
- Provides global reach.
- Conduct business 24*7.
- Flexibility of accessing the information through any mobile devices.
- Payment can be done using the mobile devices itself just the same way as we do it on personal computer.
- Useful to deliver time critical and emergency information.
- Easily identifies the physical location of the handheld device. The emergence of location based applications enable the user to receive relevant information. We will discuss about location based services later in the chapter.
- Customized alerts can be easily received on the mobile device.
- Instant connectivity and availability of faster 3G services has made M-commerce more popular these days.
- Timely information can reach the user. The information like flight or train schedule, delay or cancellation can be given to the user on his mobile device on real time basis.

Limitations of M-commerce

Though the list of advantages of M-commerce is large it has a number of limitations. Some of the limitations of M-commerce are listed below :

- The handheld devices commonly used today offer a limited screen size. This further limits the types of file and data transfer. At times it is difficult to display videos.
- User interface is less convenient when compared to personal computers.
- Mobile devices have limited computing power, memory and storage capacity.
- It operates over wireless networks which are less secured as compared to wired network.
- It offers a limited bandwidth.
- High cost of establishing mobile and wireless broadband infrastructure.

Applications of M-Commerce

Applications of M-commerce are increasing rapidly. It is used today in many areas not limited to the ones that are discussed here. More and more applications will be introduced in the near future. Let us discuss some of the applications of M-commerce.

Mobile Marketing and Advertising

Today, companies are using M-commerce to expand their services from marketing to advertisement. Mobile advertising is one of the most popular ways for companies to reach a large audience. Advertising on Internet has become a major source of revenue for most of the portals. Many retailers are offering location based mobile advertising in order to target consumers and increase their sales. An advertisement placed on the mobile device of the user can thus be made on personal requirements and location-specific. It can update the users about the various discounts and schemes available in the nearby areas of the current location of the user.

Mobile Ticketing

Users can easily buy tickets for air or rail travel, movies etc. The tickets can be sent to the user's mobile device. Users can further show these tickets on their mobile devices at the respective place. Tickets can also be easily cancelled on the mobile phones using the application or accessing the portals of travel agents. This helps in reducing the traffic and the parking problems which are increasing day-by-day as the user need not travel to the place for buying tickets.

Figure 5.1 shows the Indian Railway Catering And Tourism Corporation limited (IRCTC) login page.

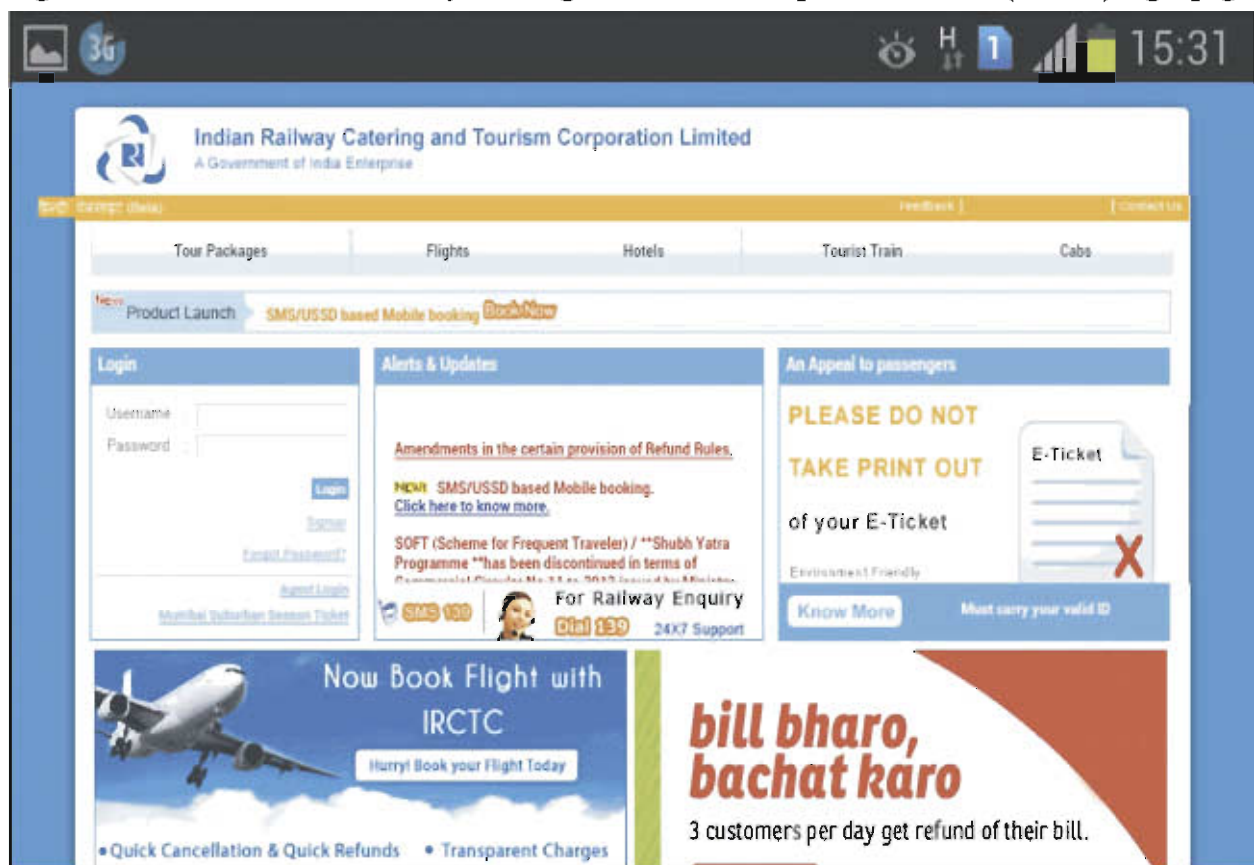


Figure 5.1 : IRCTC login page

Let us try to book an online ticket using the mobile device. After providing the username and password (note: the user already has an account), the user can give his plan travel details like source and destination name, date of travel, ticket type and quota as shown in figure 5.2.



Figure 5.2 : Details of Journey

When the user clicks on Find Trains button he/she is provided with the list of trains available on the given date as per his/her requirement as shown in figure 5.3.

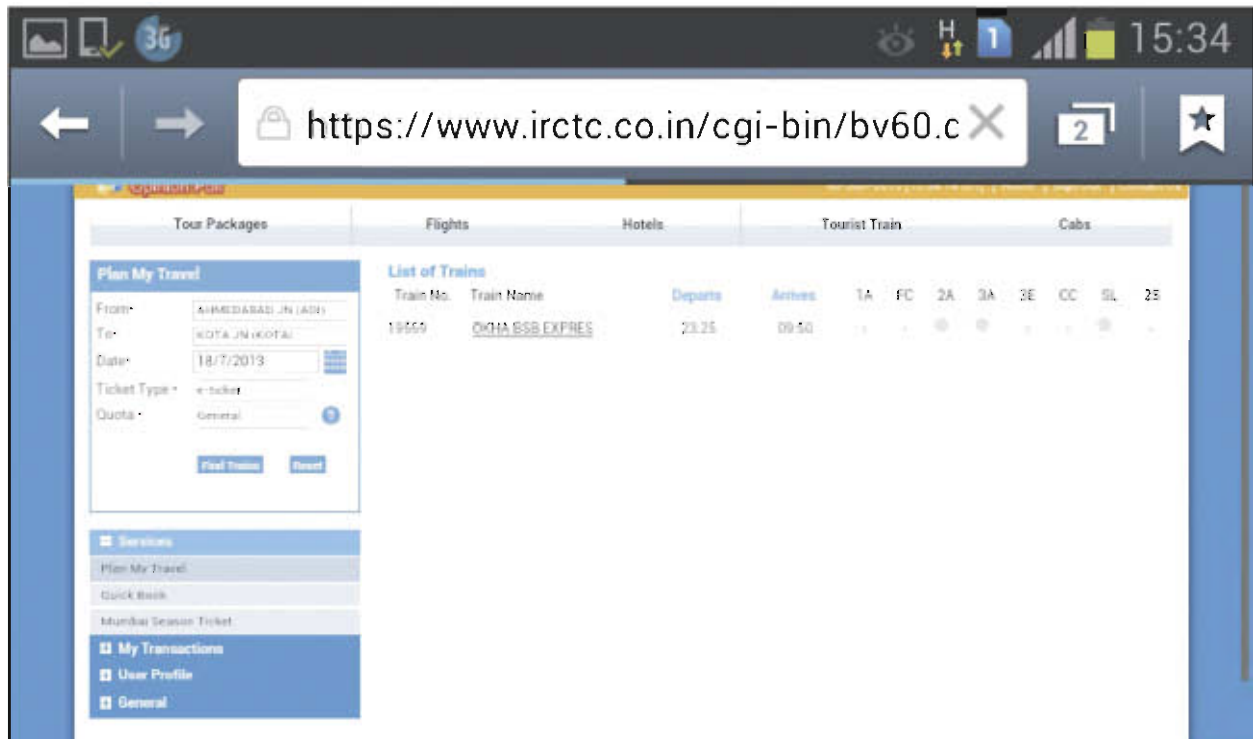


Figure 5.3 : Details of the journey with available train list

The user can click on the name of the train to get more details. In figure 5.3 we can see name of only one train. It is possible to get list of more trains also. Later, he/she can proceed to book the ticket and provide the details of the passengers travelling as shown in figure 5.4.

SNo	Name	Age	Sex	Birth Preference	Senior Citizen
1			Select	Choose Birth	<input type="checkbox"/>
2			Select	Choose Birth	<input type="checkbox"/>
3			Select	Choose Birth	<input type="checkbox"/>
4			Select	Choose Birth	<input type="checkbox"/>
5			Select	Choose Birth	<input type="checkbox"/>
6			Select	Choose Birth	<input type="checkbox"/>

CHILDREN BELOW 3 YEARS (FOR WHOM TICKET IS NOT TO BE ISSUED)
[Child Passenger Details](#)

Figure 5.4 : Enter details of passenger for ticket booking

After booking, the user gets an e-ticket message from IRCTC on the mobile device which can be presented at the time of travelling. As you can see, without being fixed at the computer terminal or being physically present at the railway station, the customer can access the services using the mobile device whenever and wherever he/she goes.

Mobile Auctions

The auctions sites are becoming more popular these days. Mobile devices further help in increasing the reach of these auction sites. A user while on the move can access these sites, make a bid, monitor bids and take a timely action on the bidding process. Many of the auction sites have built gateways and interfaces to provide access to mobile devices through wireless networks. Figure 5.5 and 5.6 shows the auction site ebay as viewed on a mobile device. The user can bid for the products using the mobile device.

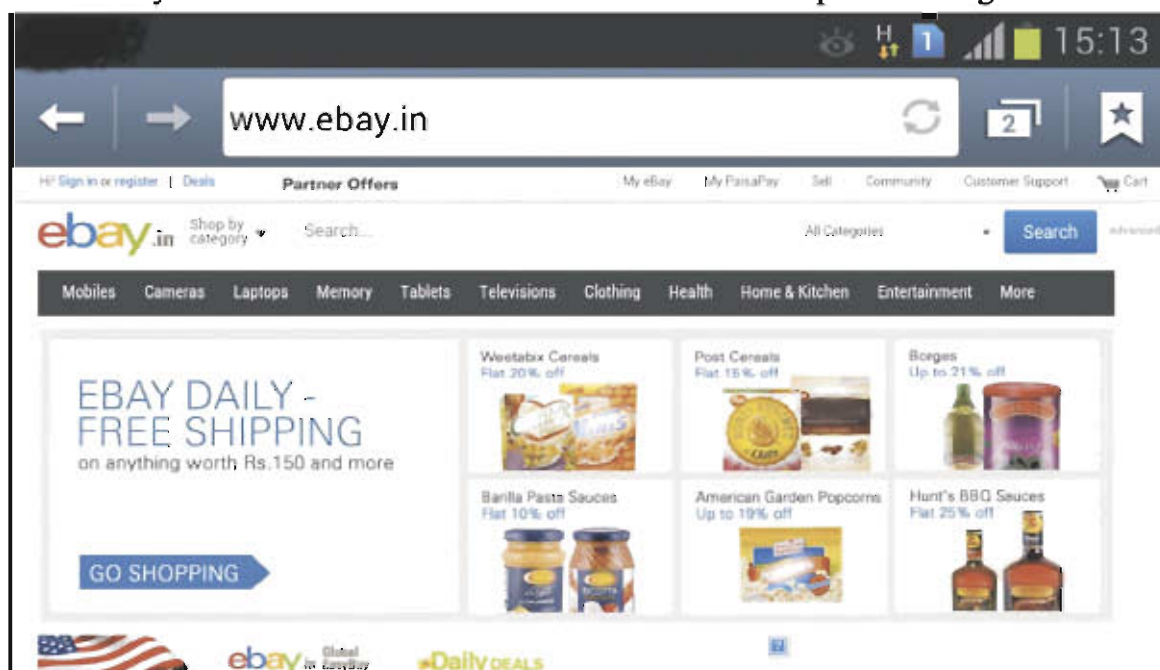


Figure 5.5 : Home page of ebay

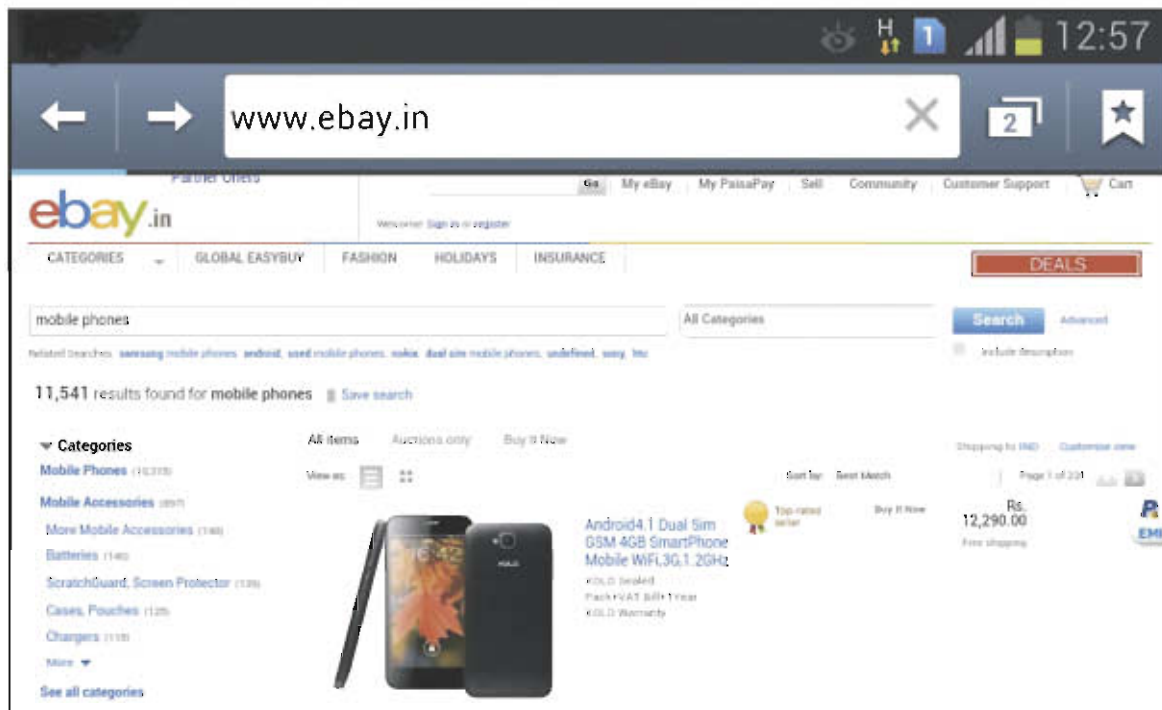


Figure 5.6 : Bid for a product

Mobile Entertainment

Mobile devices are used extensively for listening to audio, viewing video and playing games. The mobile users can subscribe to entertainment libraries where they can search for songs, videos or games and easily download them in their device for playing later. Entertainment services such as pay-per-download, pay-per-event or on subscription basis can cater to a large number of mobile users and are willing to pay for the services.

Mobile Purchase

Mobile purchase allow customers to shop online anytime anywhere. Customers can browse and order products while using a secure payment method. Instead of using paper catalogue, retailer can send a list of products that a customer would be interested in, directly to their mobile device. Alternatively, the consumers can also visit a mobile version of a retailer's E-commerce site. The retailers can also track the customers and notify them of discounts at local stores that the customer would be interested in. Figure 5.7(a) shows the home page of flipkart as seen on mobile device. Figure 5.7 (b to f) shows the purchase process from selecting a category, choosing the product, viewing its detail, placing the order and provide the shipping details on the mobile device.

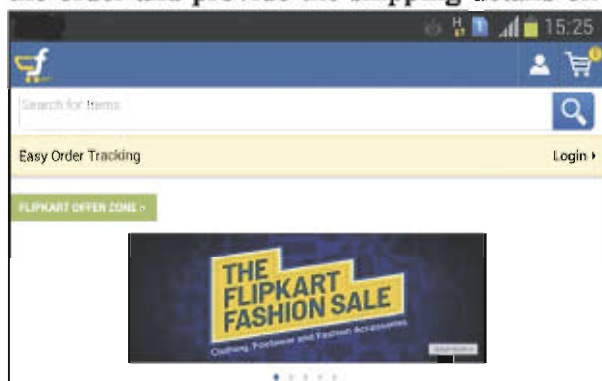


Figure 5.7(a): Flipkart home page

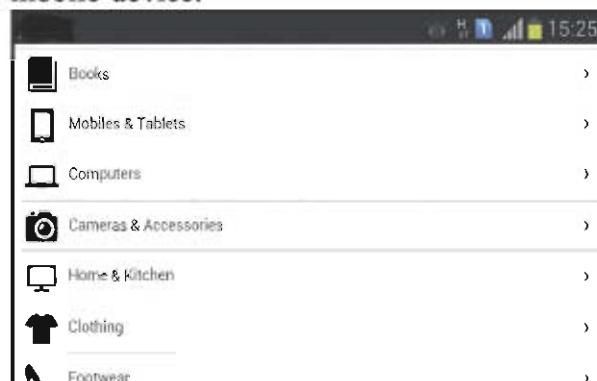


Figure 5.7(b): Select a category

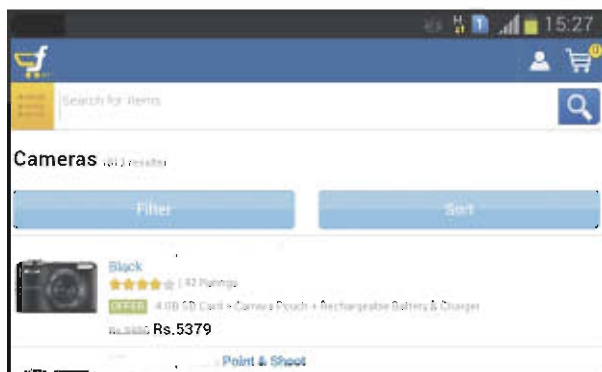


Figure 5.7(c): Products in the category

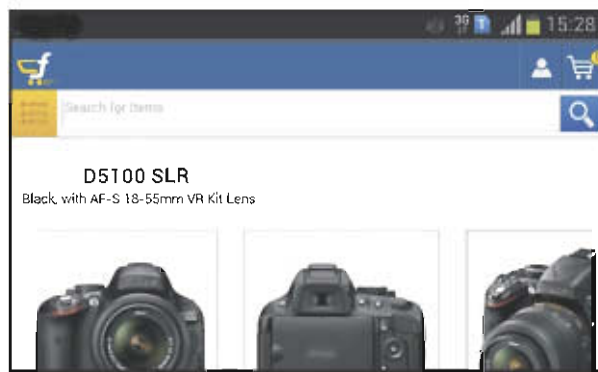


Figure 5.7(d): Select a product

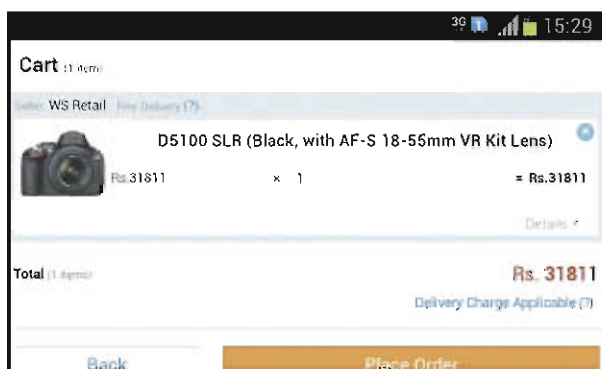


Figure 5.7(e): Place order

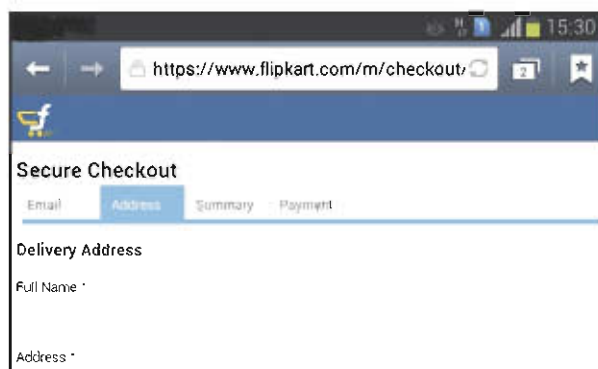


Figure 5.7(f): Provide customer details

Mobile Financial Services

Today, many popular banks and financial institutions use M-commerce. They allow their customers to access account information; perform transactions like stock purchase, remit money, via mobile phones and other mobile equipments. Figure 5.8 shows the mobile services provided by Union bank. The customer can download the application "umobile" from the android market. After getting registered, the customer can avail the services that are provided by the bank on his mobile as shown in figure 5.9. In figure 5.10, you can see the various main menu options. The customer can check his/her balance, transfer the funds to any other bank account, place request for a cheque book and can avail many other services from his/her mobile device.

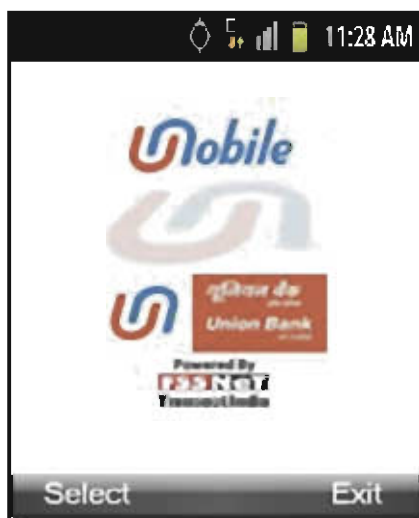


Figure 5.8 : Mobile Financial services



Figure 5.9: Login using password



Figure 5.10 : List of various services

Mobile Information Services

A wide variety of information services can be delivered to mobile phone users in much the same way as it is delivered to personal computers. The services include :

- News service
- Stock market data
- Sports news
- Financial records
- Traffic information

Location and search service

The location of the mobile phone user is an important piece of information used during mobile commerce transactions. For example, a consumer wanting to buy a Smartphone within a certain price limit and specifications would be interested in knowing the nearest location of the store where he can get the desired product. In this case, it is important that the location and search service should be able to provide the list of stores in the city or nearby areas of the mobile user's current location. Knowing the location of the mobile user allows vendors to provide location based services such as local maps, local offers, local weather, people tracking and monitoring. Mobile devices can also be used to get directions to particular place, movie theatre, restaurant, hospital or other such amenities. Let us learn about location based search which is known as L-commerce.

L-Commerce

With more and more wireless handheld devices like PDA's, Cellular phone and pocket PC's there are significant opportunities for the growth of M-commerce. Although mobile commerce enables access to goods and services regardless of the location of buyer or seller, in many situations the specific location of the buyer and seller is important to the transaction. Today various location-specific applications and services are emerging. These applications track the user's location in order to deliver a service or product. The use of technologies which provide the location information for business purposes is known as L-commerce.

The technology uses the geographical location of the mobile device to determine which applications are appropriate based on that area. It enables users to log their locations, track the location of another person, and find places such as a bank or restaurant. The technology works by using signals

from GPS, cellular and Wi-Fi sources. The Global Positioning System (GPS) is the most accurate in determining a mobile device's position. It is based on a worldwide satellite tracking system where the GPS signals are generated by a group of satellite that orbits around the Earth. To locate a point, a mobile device will utilize three satellites to create an intersecting point that locates the device within 500 meters. This is known as triangulation. If the GPS signal is poor, weak or blocked, the mobile device can use the signals from cell towers and Wi-Fi hot spots. These signals do not broadcast their own locations but Smartphone companies use databases that store the locations of these sources.

Figure 5.11 shows the application which tracks the user's location on the mobile device using GPS. (Note: GPS must be enabled on the device). The advertisements seen on the mobile device in the figure 5.11 are also location specific. In the figure the user's current location is CG road in Ahmedabad. If the user wants to search the restaurants that are close to his current location, he selects the restaurant option in the figure 5.12. This will show a list of restaurants that are near to his/her current location. The user can also specify the distance as shown in figure 5.13 to search within a specific range of distance only. This will further help in filtering the search results as shown in figure 5.14.

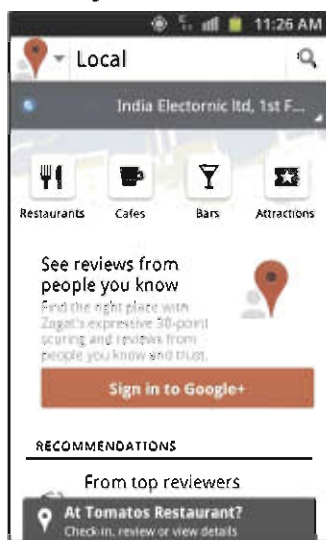


Figure 5.11 : Location specific application



Figure 5.12 : Search nearest restaurants according to user's location

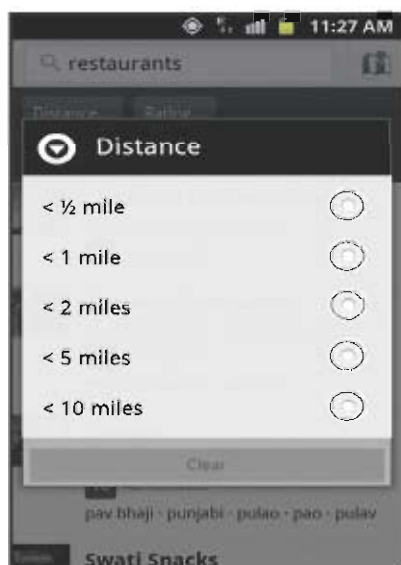


Figure 5.13 : Filtering the search result

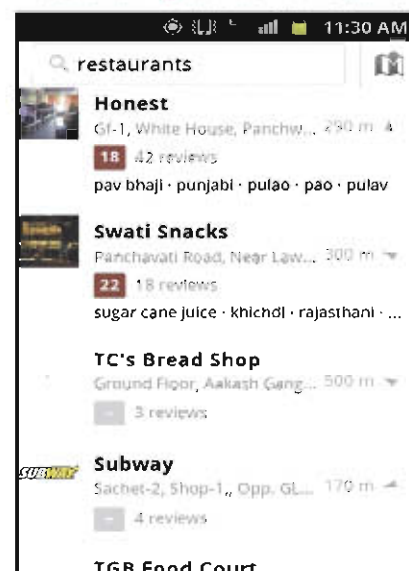


Figure 5.14 : Search result after filtering

Let us discuss another example of location based services, where we can use maps to find the path to the destination. For example, the user wants to reach a particular destination whose path is not known to him. Using the maps, the location based services tracks the user's current location as seen in figure 5.15. The current location is indicated using blue color pointer. Now to find the destination we can either type or speak the destination name as shown in figure 5.16.

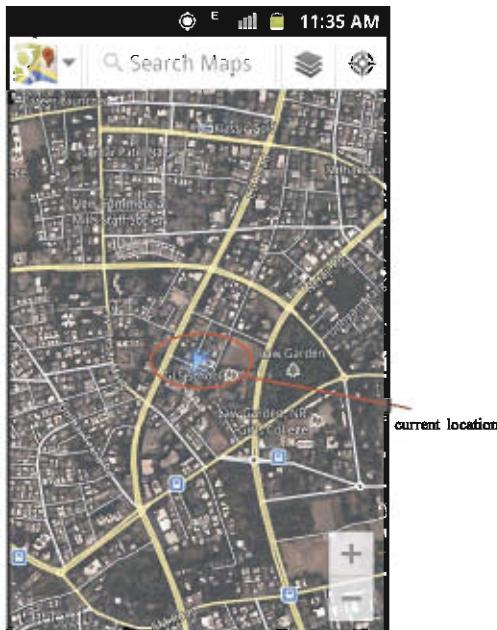


Figure 5.15 : Use of Maps to find the user location

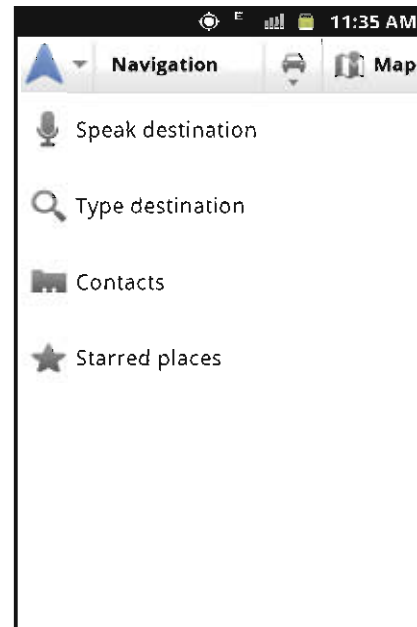


Figure 5.16 : Options to enter destination

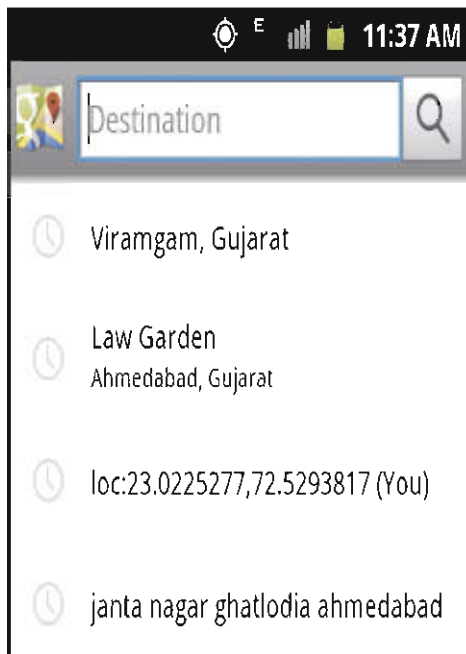


Figure 5.17 : Select the destination

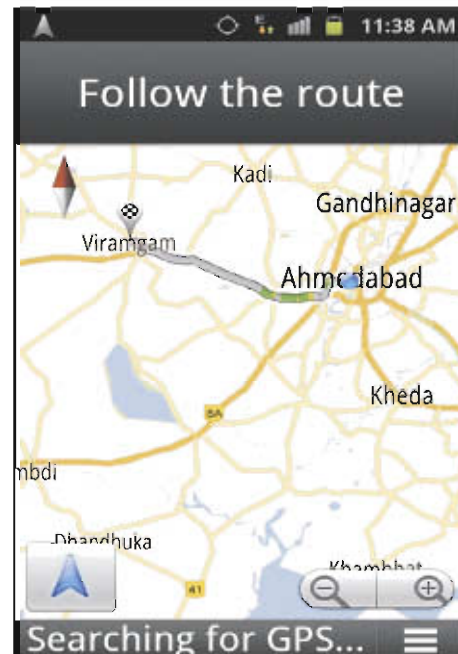


Figure 5.18 : Route to the destination

As seen in figure 5.17, the destination "Viramgam" is selected. The map shows the route from source to destination as shown in figure 5.18.

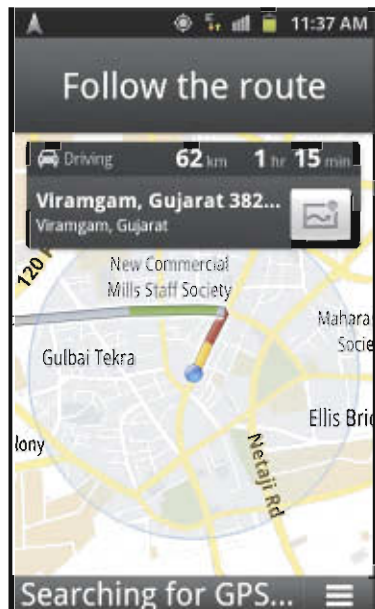


Figure 5.19 : Distance and approximate time to reach the destination



Figure 5.20 : Driving directions

The distance to the destination and the approximate time to reach the destination is also shown in figure 5.19. We can also see the driving direction to the destination as shown in figure 5.20.

Location based services offers convenience and opportunity to provide services that are more quick or precise and can meet a customer's needs. Some examples of location-based applications are:

- Information or directory services: dynamic yellow pages automatically inform the users about the nearest restaurants, parking facility, traffic updates.
- Tracking services: tracking of assets, locating friends in a geographic location, tracking stolen cars, tracking of children by parents.
- Emergency services: emergency medical ambulance, search and rescue mission, roadside assistance, police and fire response.
- Advertising promotion: targeted ads, promotional messages, customer identification in a store.
- Mapping: Creating maps of specific geographical location
- Navigation: plotting route from one place to another

Security Issues in E-commerce & M-commerce

Internet is a public network system that consists of thousands of private computer networks connected together. These private computer networks are exposed to potential threats from anywhere on the public network. Internet provides a good opportunity to the businesses but along with the convenience also come new risks. The valuable data or information that travels on the Internet may be misused, stolen, corrupted or lost. For example, while making online purchase on the E-commerce website, customer needs to provide the credit card number and the personal details. This information is transmitted to the merchant server. The merchant server sends it to the issuing bank for authorization through payment gateway. All these transmissions occur on the public network i.e. Internet. An

unauthorised user may read credit card number during the transmission and misuse it later on. Also, there are possibilities that order information might be changed in between. If the customer has ordered 10 items, and somehow the merchant receives order of 100 items, he would ask us to pay for 100 items. An intruder can steal or tamper information anywhere in the world while sitting on his computer. He can create new programs and run them on remote computers causing it to malfunction or break down in worst cases while hiding his identity.

E-commerce/M-commerce sites have to keep their online data such as customer's personal details, their bank details and many more safe. They have to be aware of all the frauds that are taking place now-a-days. As E-commerce deals with payments such as online banking, electronic transactions, using debit cards, credit cards and many others; the E-commerce/M-commerce websites have more security issues. They are at more risk of being targeted than other normal websites. Thus, it becomes very important to secure the data on Internet. The E-commerce/ M-commerce security must meet four important aspects as mentioned below:

- **Confidentiality**

It refers to the secrecy of the information so that unauthorized user cannot read it. It is achieved by using cryptography in which all the messages transmitted are encrypted and only the receiver can read it after decrypting the message using appropriate key. This protects the data from private attacks and ensures that the message is not revealed or leaked to anyone as it travels to the destination. It helps in protecting the confidential data like credit card number.

- **Integrity**

It ensures that the information must not be accidentally or maliciously altered or tampered in transit. The receiver should receive the same message as was sent by the sender. If the message is altered in between the transition, it should be detected. This removes the problem of modifying the order quantity in between and later creating the payment problems.

- **Authorization**

It ensures that only authentic users are allowed to use the system. The login and password is one of the ways to achieve authentication.

- **Non-repudiation**

It ensures that the sender of the message cannot deny that he/she has sent the message. It prevents sender or receiver from denying a transmitted message when in fact they did send it. For example, if the customer denies of sending a purchase order for any reason, then it can be proved that the customer has send the message. It is usually accomplished via digital signatures or a Trusted Third Party (TTP).

Internet Security Threats

The most common threats that are faced on Internet are :

- **Malicious code**

Malicious code is one that causes damage to a computer or system. Malicious code can either activate itself or be like a virus requiring a user to perform an action, such as clicking on something or opening an email attachment. It can also affect a network, send messages through email and steal information or cause even more damage by deleting files.

- **Sniffing**

A sniffer is a program that uses Internet to record information that passes through a computer or router in transit from sender to receiver. Using a sniffer program is like tapping the telephone wire and recording the conversation. Sniffer programs can read e-mail messages, user login, password and credit card numbers.

- **Denial of service attack**

A Denial-of-Service (DoS) attack is an attack used to shut down a machine or network, making it inaccessible to its intended users. By targeting the user's computer and its network connection, or the sites which the user tries to access, an attacker may be able to prevent the user from accessing email, websites, and online accounts like banking or other services that rely on the affected computer. The users are flooded with hundreds and thousands of messages that create traffic problem on the network.

- **Cyber Vandalism**

Cyber vandalism is the electronic defacing of an existing website page. An attacker replaces the website's original content with his/her own content. It is an example of integrity violation. It is the electronic equivalent of destroying property or placing graffiti on someone's photograph. Today, there are so many cases of cyber vandalism where the business content is replaced by offensive material.

- **Spoofing**

Spoofing or masquerading is pretending to be someone you are not, or representing a website as authentic when it is actually a fake. It is a technique where the attacker tries to assume the identity of another person or system for transacting with victim site. For example, an attacker can create a fake website as www.gswan.co.in and substitute his IP address for the real website IP address. All the user's visiting to the real site will then be redirected to the fake website.

Security measures

To prevent the various security threats many security measures are taken. Let us discuss some of them.

- **Antivirus software**

Antivirus software is a computer program that detects, prevents and takes action to remove the malicious codes like viruses, worms and trojan horses from the infected system. To protect your computer you need good antivirus software. A system without antivirus software can easily be targeted by malicious code within a short span of time on Internet. The problems and damage that are caused by an infection can be extremely varied. The infection may be simple as causing strange noises, pop-ups and other annoying things on the system. It may delete the files and slow down the system or also can damage the hardware or destroy the entire computer system. Once a system is infected by virus, it will spread by attaching to other programs and files within the system. Viruses not only replicates itself within the system but can also spread to other systems by taking control of the users email and sending out copies of itself to those in the users contacts list. The most common way a system is attacked is through infected attachments

to email. These attachments can be in the form of pictures, videos, sound clips or any other type of file that can be attached to an email. Infections can also be spread through Internet downloads.

To prevent harm to the system, the antivirus software scans the downloaded files and the entire computer system in order to detect the presence of an infection. Today, we have antivirus software for mobile devices also due to prevalent use of Internet on these devices. You can find a large range of antivirus software in the market. Antivirus software is critical to be installed and kept updated regularly on the computer.

● Firewall

Companies having their own websites have to control the access to the network services both inside and outside the company network. The most commonly used network protection barrier between the company's network and the outside world is a Firewall. As shown in Figure 5.21, firewall is a device (a computer or a router) placed between the network and the Internet to monitor and control the traffic between the company's local network and the outside world. The primary goal of a firewall is to keep intruders away from the company's E-commerce infrastructure. It ensures that the company's crucial data is kept safe and not accessed by the intruders.

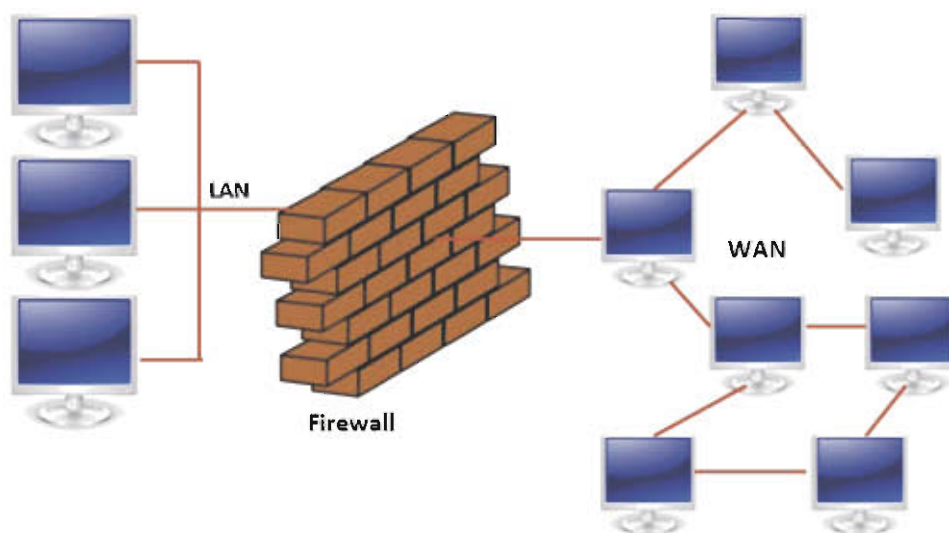


Figure 5.21 : Firewall placed between local and public network

A firewall protects the local network against the following :

- Email services that sometimes create problems.
- Undesirable material like photos, videos entering into local network.
- Unauthorized persons gaining access to local network.
- Unauthorized data or information leaving the company's network.
- Blocks the traffic from outside world to the local network.
- Protects from any type of network attack.

- **Digital Certificate**

Digital Certificates or Digital ID are used for proving our identity in electronic transactions. Just as we have a driving license or a passport to prove our identity in the real world. With a Digital Certificate, we can assure the business organisations, online services and friends that the electronic information they receive from us are authentic. Digital certificate is issued by a trusted third party to establish the identity of the holder. The third party who issues certificates is known as a Certification Authority (CA). Digital Certificate contains the holder's name, a serial number, expiration dates, a copy of the certificate holder's public key which is used for encrypting messages and digital signatures, and the digital signature of the certification authority so that a receiver can verify that the certificate is real.

- **Cryptography**

Cryptography is an art of protecting the information by transforming it into an unreadable form. Encryption is the transformation of normal text known as "plain text" into unreadable or secret text known as "cipher text" using encryption algorithm. A secret key is used to encrypt and decrypt a message. It does not hide the text but converts it into other text that does not make any meaning. Its purpose is to ensure privacy by keeping the information hidden from anyone on the Internet except the receiver of the message. Messages are encrypted just before they are sent on the Internet or network. When the encrypted message is received by the receiver, it needs to be decrypted. Decryption is the reverse of encryption. It is the transformation of encrypted text back into normal text. There are number of encryption algorithms available in the market today.

In recent years, number of cases has been reported where the data in transit was intercepted. Encryption is used to protect data in transit, for example data being transferred via networks like Internet or E-commerce, mobile telephones, Bluetooth devices and bank Automatic Teller Machines (ATMs). Assume that you want to send a message "HOW ARE YOU?" to your friend. However, to protect the message you want to encrypt it. Using encryption we create a coded message to be sent to your friend. Here the encryption mechanism substitutes each alphabet with the alphabet that comes after it. This means that "A" becomes "B," and "B" becomes "C" and so on. You have also told your friends that the code to decrypt is "Shift by 1". Your message will now be encrypted as shown in the figure 5.22 :

H	O	W	A	R	E	Y	O	U	← Plain text
I	P	X	B	S	F	Z	P	V	← Cipher text

Figure 5.22 : Encryption using key

Your friend when he gets the message can decode it. Anyone else who sees the message in transit will only see weird characters. The key kept here is simple, but usually they are quite long.

For E-commerce security various protocols are also used. Let us understand the SSL protocol.

- **Secure Socket Layer (SSL)**

Now-a-days every user sends various types of data from email to credit card details. The user

wants this data to be protected when in transit over a public network. SSL protocol is used for securing web transactions on the Internet. It was developed by Netscape. During the E-commerce transaction, all the information is exchanged in secured manner using SSL by encrypting all the messages. It also provides the authentication of the merchant or shopper using a digital certificate so that the customer knows that they are communicating with a valid owner. To identify whether a site is secured, a security logo is present on the screen. If a site is secured by VeriSign, then the security logo of VeriSign is displayed on the login screen of the secured site. On clicking, you will get the owner information and the validity of the certificate. This indicates that the communication with this site is secured and the owner of the website is valid who is certified by the authority like VeriSign. The other indication of the security is that whenever connection is made to the secured site its address starts from https:// rather than http:// as shown in figure 5.23.

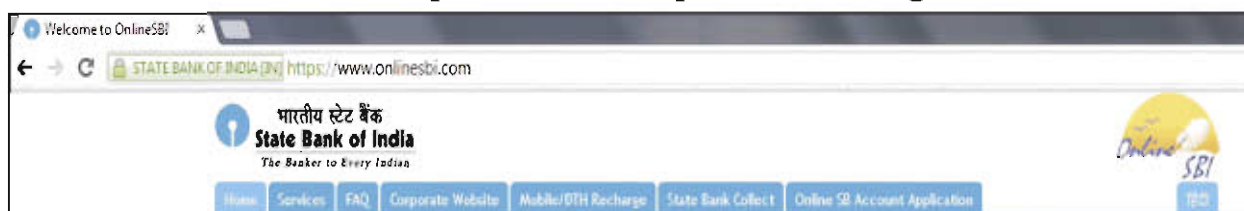


Figure 5.23: Example of https://

Legal Issues in E-commerce/M-commerce

E-commerce as well as M-commerce presents a world of opportunity for doing businesses, reaching global markets and providing facility of online purchasing. It provides opportunities to improve the business processes. However, just as any new business has some issues and risks so does E-commerce and M-commerce. Both of these pose many legal challenges, as it is the activity performed on global Internet without observing national boundaries. Every nation has its own rules and regulations. The major challenges are related to the intellectual property rights, copyrights, privacy and many times the disputes among the parties. The legal framework is necessary to resolve these issues. Many countries have already established their legal framework for electronic commerce. Indian Government has also established the IT laws (Information technology laws) under the IT act.

Enforcement of legal rules and regulations provides confidence to the customers that their personal information remains secret and will not be misused. If it is misused, responsible party can be punished. This type of security is a must in E-commerce and M-commerce as customers provide their sensitive information like credit card details. Companies making online business are getting legal support in case of misuse of their logos or any copyright materials like digital content. Any dispute between two parties can be resolved under these laws.

Securing Intellectual property

The intellectual property includes books, software's, music, video, copyrights, trademarks and web pages. Let us discuss some issues related to them.

• Copyright

Copyright provides the author with a tool to protect his/her original work from being used or taken by others without permission. It is applicable to books, software programs and articles. Copyright law protects intellectual property in its various forms, and cannot be used freely.

It is very difficult to protect Intellectual property in E-Commerce or M-commerce. For example, if you buy software you have the right to use it and not the right to distribute it. The distribution rights are with the copyright holder. Also, most of the web pages are protected by copyright. In that case, copying contents from the website also violates copyright laws.

- **Trademark**

It is a specific logo, mark, word, symbol, design, phrase or image which is used by an individual or a company to distinguish a product or service from that of others in the market. A trademark may be designated by the following symbols: TM, SM and ®.

- **Domain name disputes**

The competition over domain names is another legal issue. Earlier, the domain names were given on first come first serve basis. Thus people would register domain names that were not in use but would be of importance. Later on such domain names were sold to concerned company at a very high price. This is known as cyber squatting. Another problem is Name changing where someone registers purposely misspelled variations of well known domain names. This can mislead the consumers who generally make typographical errors while entering a URL.

Protecting Intellectual property

Several new and improved methods are continually being developed to protect the intellectual property. Some of them are discussed here.

Steganography

Steganography is the process of hiding information within other information. The information in the files if not protected can be used for any malicious purpose. It works by replacing unused data in computer files such as images, sound or text with invisible information. This hidden information can be plain text, cipher text, or even images. Special software is needed for steganography, and there are freeware versions available on Internet which can be easily downloaded.

Digital Watermarking

The watermark is a digital code inserted into a digital image, audio or video file which can identify the file's copyright information. It also allows hiding information in a totally invisible manner. Earlier, artists used to creatively sign their paintings with a brush to claim copyright. But in digital world, artists can watermark their work by hiding their name within the image. Hence, the invisible embedded watermark helps to identify the owner of the work.

This concept is also applicable to other media such as digital video and audio. Currently the unauthorized distribution of digital audio over the Internet in the MP3 format is a big problem. In this case, digital watermarking may be useful to set up controlled audio distribution and to provide efficient means for copyright protection. In the field of data security, watermarks can be used for certification and authentication. For example, the photo identity card of a person can be protected by an identity number "123456" written on the card and hidden as a digital watermark in the identity photo. So, manipulating or changing the identity photo can be detected easily.

Digital watermarking can also link information on the documents. For example, the name of a passport owner is normally printed in clear text. But using digital watermark, the name can also be hidden

in the passport photo. If anyone tries to tamper with the passport by replacing the photo it would be possible to detect the change by scanning the passport and verifying the name hidden in the photo. A visible digital watermark can be added to any image using photo editor tools like GIMP.

Payment in E-commerce/M-commerce

Payment is one of the most important aspects of E-commerce as well as M-commerce. In traditional payment method we do the payment using cash, cheque or credit card. Electronic payment systems are becoming more important to the online business processes as companies are looking for different ways to serve the customers faster and at low cost. Electronic payment is a financial exchange that takes place online between the buyer and the seller. There are various payment options available for payment in the market today. The different types of electronic payment systems used are:

- **Payment cards**

The payment cards can be classified as Credit cards, Debit cards and Smart cards, generally, businesses use the term payment card for all types of plastic cards that consumers use to make purchases.

Credit card

This is one of the most popular and widely accepted methods of payment on Internet. A credit card is issued to the customers by the banks known as issuing banks. The issuing banks provide the credit cards of the financial institutions which are established and reputed in the services of credit card business. Examples include MasterCard® or Visa®. Depending upon the customer's credit history and income level, credit limits are provided and up to that limit the customer can spend and pay to the issuing bank within the billing period.

As the credit cards are linked to a bank account, when we use them to pay online, the merchant charges the goods to the issuing bank account and the bank shows the debit on your next statement. The customer simply pays the bank. For accepting payments on websites through credit card, merchant needs to open a merchant account with the banks known as acquiring banks, which provide the services of online authorization and payment processing. Authorization is the process of verifying whether the card is active; the credit limits are available to make purchase and verifying the other details of the customer like billing information. Credit cards are widely accepted by merchants and provide assurance to the customer as well as the merchant. Figure 5.24 shows some credit cards.



Figure 5.24 : Examples of Credit card

In credit card transactions over the Internet, the customer visits the merchant's website and selects goods to buy, all the information related to credit card is entered and then this information is transmitted to the merchant electronically. In this transaction four parties are involved :

- Customer with credit card
- Merchant accepting the credit card
- Issuing Bank: issues the credit card and guarantees the payment to the merchant. The bank collects the payment from the customer.
- Acquiring banks: Financial institution that establishes the account with the merchant validates the credit card information of the customer and authorises sale based on the customer's credit limit.

Two more entities play role in online payment. These are payment gateways and processors. Payment gateways are services provided by the third parties like PayPal which connects networks of all the parties involved and enables to perform authorization and payment in secured manner. Processors are data centres which perform the credit card transactions and settle funds to the merchant. Processors are connected to the E-commerce website of the merchant through the payment gateway.

The online payment through credit card on Internet is divided into two parts: Authorization and Settlement. During authorization the following steps are performed :

- Customer checkouts, provides credit card information on the E-commerce website, which along with the transaction details (like item detail, date of purchase and others) is transferred to the payment gateway.
- The payment gateway passes the information to the processor which contacts the issuing bank for the verification of the information.
- After verification, issuing bank sends the status of verification (or transaction result like accepted or rejected) to the processor which in turn passes it to the payment gateway.
- Finally, payment gateway sends the result of the transaction to the merchant's website. If the merchant accepts the transaction then the next step is the settlement during which it transfers the amount from the customer's account to the merchant's account.

During the settlement or payment processing the following steps are performed :

- Merchant sends the transaction request with all the details to the payment gateway which sends to the processor.
- Processor sends the payment details to the issuing bank of the customer. It also sends the payment details to the acquiring bank where the merchant has an account.
- The acquiring bank credits the amount to the merchant account. The issuing bank after including all the charges sends the bill to the customer which he needs to pay within the billing period.

Major credit card companies use the Secure Electronic Transfer (SET) security system to make online transactions secure.

The advantages of credit card are :

- Gives flexibility to the customer as they do not have to carry lot of cash. Customer can pay for goods and services both online and offline.
- Keeps record of the customer's purchase through the bank statement.
- Allows customers to purchase goods even when they do not have the cash available in the bank account. They can settle the cash by the end of the month.

The limitations of credit cards are :

- They are unsuitable for very small or very large payments. Also, due to security issues, these cards have a limit and cannot be used for excessively large transactions.
- Customers tend to overspend using credit cards.
- Problems arise in case lost or stolen credit cards.

Debit Cards

A debit cards looks like credit card but works differently. It is a kind of payment card that transfers fund directly from the consumer's bank account to the merchant. The amount is immediately deducted from the bank account of the consumer. The debit cards can keep the consumer purchases under a limit and do not allow him to exceed beyond his/her budget. But while using a debit card for a purchase, the consumer should always be aware of his account balance. Figure 5.25 shows an example of debit card.



Figure 5.25 : Example of Debit card

Smart Cards

Smart cards look just like credit cards but are different as they have a microchip embedded in their surface. A smart card contains user's private information, such as account information, health insurance information, private keys etc. It can store 100 times more information than the normal cards. They are much safer than the credit or debit cards as the information stored in the smart card is encrypted. Customers can load their card with cash and then use this to pay for goods in a merchant's retail outlet or web site. Card readers are available for retail outlets as well as an attachment for PCs. This convenience gives a great advantage to smart cards. They can be used for a range of purposes like storing digital cash, storing a patient's medical records etc. Smart cards are popular in countries like U.S., Europe, Japan and some parts of Asia.

A smart card reader is required to read information or add data to it. It is small device into which the smart card is inserted. For example, when you visit your family doctor, you can give him your smart card to review the medical history and prescribe medicines. This information is also inserted into the smart card. At the medical store, you hand over your card to the pharmacist, who sees your prescription, and give you the medicine accordingly. Also, the payment can be done using smart card.

Charge cards

A charge card is another form of payment mechanism wherein the customer can pay through the card to the vendor. As compared to credit cards that have a credit limit, the charge card does not carry any spending limit. The customer has to pay the total amount used at the end of the billing period to the company that has issued the card. If the total amount is not paid back then the customer has to pay a late fee.

• Net Banking

Another option which is becoming more popular is net banking or online banking. It does not involve any type of card. It can be used by customers who have bank accounts enabled with Internet banking. The bank provides the net banking password to the customer for operating the account from Internet including the payment for online purchases. Many of the E-commerce/M-commerce websites provide the facility to make the payments using net banking. Instead of entering card details on the website, it allows one to specify the bank through which you wish to pay from. On these websites, when you proceed to make the payment, you will be asked to select your bank. Once you select the bank, you will see the screen of your bank's website where you need to log in using your account number and net banking password. You can perform the transaction and transfer the amount from your account to the account of the merchant.

Indian railway provides the facility to book tickets online on their website www.irctc.co.in. First, the user needs to register on the site and then provide the details of the journey along with the passenger information. Once the information is filled up you can proceed to the payment where net banking option is provided. Select your bank and continue further which displays the login screen of your bank and transfer the fund to Indian railway to complete the booking. After successful payment, the user gets a message on the registered mobile number from irctc, which can be shown at the time of travel or E-copy of the ticket can also be printed. Net banking payment system is seen as being safer than using credit cards as nearly all merchant accounts in India offer it as an option.

• Electronic Fund Transfer

Electronic Funds Transfer (EFT) means transferring money from one bank account to another electronically. It is safe, secure, efficient, and less expensive than paper check payments and collections. Examples of EFT are: transactions amongst various banks around the world, payment of tuition fees using an ATM, deposit of employee's salaries in their accounts, monthly bank account deductions and many more. The popularity of EFT for online bill payment is growing. The benefits of EFT include reduced administrative costs, increased efficiency, simplified bookkeeping, and greater security. However, the number of companies who send and receive bills through the Internet is still relatively small.

- **E-wallet**

Most of the time when you make purchase on the web, you are required to fill out a form with your name, shipping address, billing address, credit information, and so on. Doing this a few times is fine, but having to do it every time you shop on the web is an annoyance. Some merchants solve the problem by having you fill out a form once, and then saving the information stored on their servers for later use. These merchants provide e-wallet services to its customers which makes the shopping or booking of tickets much easier for its customers. Today many banks, online grocery stores, telecom services etc. provide e-wallet services. E-Wallet is an electronic card for making secure online payments towards a merchant. It works just like a credit or a debit card. While making payment through e-wallet the customer is not required to provide the credit/debit card number thus reducing the risk of credit/debit card number being exposed.

For example, IRCTC has launched e-wallet scheme for the customers to make online booking easier. The customers having an account can deposit money in advance with IRCTC which can be used in future as payment option to book the tickets online. Currently the users have to provide the credit/debit card details for booking tickets. This payment procedure takes time as the customer is transferred to the bank's server for payment. He/she can

- **RuPay**

The term RuPay is coined from two terms Rupee and Payment. It is a new card payment mechanism launched by National Payments Corporation of India (NPCI). Figure 5.26 shows the RuPay card which can be used the same way as we use the credit and the debit cards.



Figure 5.26 : RuPay card

Currently, as there is no domestic card Indian banks have to tie with Mastercard and Visa to connect cardholders, merchants and the issuing banks around the globe. Mastercard and Visa are the world leaders in card payments and all payment transactions are processed through them. Every transaction done using a credit or debit card issued by a domestic bank is routed through their network switches which are outside the country. These transactions involve additional charges for providing the services. The banks have to pay for processing all debit and credit card payments. RuPay cards are the domestic alternative to the other payment cards. By using RuPay cards, all the transactions will be processed within India. As the transaction processing will be done domestically, the cost of each transaction clearing and settlement will be reduced. RuPay will benefit the customers and the banks by reducing the cost.

Summary

In this chapter we discussed about Mobile Commerce. M-commerce refers to buying and selling of goods and services through the use of Internet enabled wireless devices such as a Mobile phone, Personal digital assistant (PDAs), Smartphone, Tablet PCs and Palmtops. we also discussed about the advantages and limitations of M-commerce. M-commerce applications are becoming popular with the mobile users increasing day by day. Location-based commerce applications and services are emerging with significant implications for the future of E-commerce. These applications track the user's location in order to deliver a service or product. We discussed about the various the security issues and threats. Measures to be taken against the security threat are also discussed. Legal issues related to e-commerce are discussed. The various payment options provided in E-commerce like credit card, debit card, smart cards, Ru-Pay, net banking and E-wallet are discussed.

EXERCISE

1. What is M-Commerce ? List some of the examples of M-commerce.
2. Why is M-commerce helpful to the user ?
3. List the advantages of M-commerce.
4. What are the limitations of M-commerce ?
5. List some of the applications of M-commerce.
6. Give some website examples for the following M-commerce applications :
 - (1) Mobile ticketing
 - (2) Mobile Auctions
 - (3) Mobile purchase
 - (4) Mobile information services
 - (5) Mobile financial services
7. What is L-commerce ?
8. What is GPS ? How does it locate a device ?
9. List some applications of location based services.
10. What are the four important aspects of E-commerce security ?
11. Explain the following Internet security threats :
 - (1) Malicious code
 - (2) Sniffer
 - (3) Denial of service attack
12. What is cyber vandalism ?
13. Explain the term spoofing ?
14. List the various security measures taken for security threats.
15. What does a digital certificate contain ?
16. What is cryptography ? Using encryption mechanism of each alphabet with the alphabet that comes before it, encrypt the message "Gandhi Ashram".

17. What is the purpose of SSL ?
18. List the issues related to intellectual property.
19. Which are the different ways of protecting Intellectual property ?
20. List the different types of electronic payment systems.
21. List the advantages and limitations of credit card.
22. How is a smart card different from credit cards ?
23. What is electronic fund transfer ?
24. Choose the correct option from the following :
 - (1) Which of the following refers to buying and selling of goods or services through the use of Internet enabled wireless devices ?
(a) Internet (b) M-commerce (c) M-banking (d) WWW
 - (2) Which of the following is the use of technologies which provide the location information for business purpose ?
(a) E-commerce (b) M-commerce
(c) L-commerce (d) Traditional commerce
 - (3) Which of the following stands for GPS ?
(a) Global Positioning System (b) Global Postal System
(c) Grand Positioning System (d) Google Positioning System
 - (4) Which of the following security aspect refers to the secrecy of the information so that unauthorized user cannot read it ?
(a) Confidentiality (b) Integrity
(c) Non-repudiation (d) Authorization
 - (5) Which of the following security aspect ensures that the information must not be accidentally or maliciously altered or tampered in transit ?
(a) Confidentiality (b) Integrity
(c) Non-repudiation (d) Authorization
 - (6) Which of the following security aspect ensures that only authentic users are allowed to use the system ?
(a) Authorization (b) Confidentiality (c) Non-repudiation (d) Integrity
 - (7) Which of the following security aspect ensures that the sender of the message cannot deny that he/she has sent the message ?
(a) Authorization (b) Confidentiality (c) Non-repudiation (d) Integrity

- (8) Which of the following is a program that uses Internet to record information that passes through a computer or router in transit from sender to receiver ?
- (a) Sniffer (b) Denial of service attack
(c) Malicious code (d) Spoofing
- (9) Which of the following is an attack used to shut down a machine or network, making it inaccessible to its intended users ?
- (a) Malicious code (b) Denial-of-Service
(c) Spoofing (d) Cyber vandalism
- (10) Which of the following is known as electronic defacing of an existing website page ?
- (a) Cyber vandalism (b) Denial-of-Service
(c) Spoofing (d) Malicious code
- (11) Which of the following is pretending to be someone you are not, or representing a website as authentic when it is actually a fake ?
- (a) Cyber vandalism (b) Malicious code
(c) Denial-of-Service (d) Spoofing
- (12) Which of the following is a computer program that detects, prevents and takes action to remove the malicious codes like viruses, worms and trojan horses from the infected system ?
- (a) Antivirus software (b) Digital certificate
(c) Firewall (d) Cryptography
- (13) Which of the following is the transformation of normal text known as "plain text" into unreadable or secret text known as "cipher text" using encryption algorithm ?
- (a) Firewall (b) Encryption
(c) Antivirus software (d) Digital certificate
- (14) Which of the following is the transformation of encrypted text back into normal text ?
- (a) Firewall (b) Digital certificate
(c) Decryption (d) Virus
- (15) Which of the following is a protocol used for securing web transactions on the Internet ?
- (a) TCP/IP (b) HTTP (c) Bluetooth (d) SSL
- (16) Who developed SSL protocol ?
- (a) Google (b) Netscape (c) Yahoo (d) Firefox
- (17) Which of the following starting address indicates that site is secured by SSL protocol?
- (a) http:// (b) ssl:// (c) https:// (d) http-ssl://

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